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ABSTRACT

The purpose of this investigation was to assess the effects of behavioral objectives and criterion evaluation upon the classroom progress of adolescents. Classroom behavior and academic achievement were examined within the experimental setting. In assessing the importance of this study, consideration was given to classroom behavior and achievement of disruptive students, teacher expectations, and modifications of instructional techniques. Two eighth grade teachers participated, and 22 students were subjects. Four observers and one grader recorded data daily. The teachers were trained to write behavioral objectives and to employ criterion evaluation during treatment conditions. Analyses of variance showed significant differences in classroom behavior and in achievement. It was concluded that the use of behavioral objectives and criterion evaluation had a positive effect on the classroom progress of adolescents. It was also concluded that the process of remediation expanded the opportunity for learners to reach prespecified goals. (Author/BW)

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EFFECTS OF THE USE OF BEHAVIORAL OBJECTIVES AND CRITERION EVALUATION ON CLASSROOM PROGRESS OF ADOLESCENTS

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A great deal has been written about the merits of behavioral objectives for classroom instruction. Ever since the publication of Mager's Preparing Instructional Objectives (1962), many curriculum leaders, curriculum developers, programmers, and classroom teachers have prepared and used behavioral objectives. Also, several researchers have investigated the effects of behavioral objectives on learning (Smith, 1967; Engel, 1968; Cook, 1969; Baker, 1969; and Jenkins and Deno, 1971). In all of these studies, the investigators assessed the effects of merely establishing the behavioral objectives in writing as a function of the instructional procedures. Criterion achievement tests were used to assess the effectiveness of the objectives. None of the above studies provided the opportunity for the subjects to remediate; that is, none of the previous studies was designed to provide learners an opportunity to re-engage in learning activities after deficiencies had been detected.

The primary purpose of this investigation was to study the effects of behavioral objectives and criterion evaluation upon the classroom progress of adolescents. Classroom behavior and academic achievement were examined within the experimental setting. In assessing the importance of this study, consideration was given to classroom behavior

and achievement of disruptive students, teacher expectations, and modifications of instructional techniques.

METHOD

Subjects

The subjects of this investigation were selected from four eighth grade general mathematics classes in a junior high school. Most of the subjects came from rural homes which were on a lower to middle socio-economic level. Two mathematics teachers, one male and one female, participated in the study. Each teacher selected two classes and identified the six most disruptive students in each class. The subjects for all four classes included 16 male and six female disruptive students.* The California Tests scores indicated that for this group of disruptive students the IQ scores ranged from 73 to 113 with a mean of 94. Group scores for mathematics achievement, based on the California Tests, revealed the following: range, third grade-second month (3.2) to ninth grade-ninth month (9.9); median achievement, sixth grade-sixth month (6.6).

PROCEDURE

Categories of Behavior

The following categories of classroom behavior were used:

Task Relevant (TR). Task relevant behavior included answering or asking questions which were lesson-oriented, writing or reading when

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*Two of the original twenty-four students moved away during the progress of the investigation.

directed to do so, hand raising to get the teacher's attention, looking at the teacher while he is lecturing, looking at another student who is participating in lesson activity, and any other behavior which is consistent with the ongoing classroom activity. Task Relevant also included talking, laughing, or just sitting at one's desk when students had not been instructed to engage in lesson activity and when these behaviors were not forbidden by the teacher or were not impolite in nature, e.g., taking an object away from someone, hitting someone.

Time Off Task (TO). This category included just sitting at one's desk without appropriate materials or without attempting to get appropriate materials. It was looking at non-lesson material, gazing out the window, or looking around the room when lesson activity had been assigned. The subject, however, was not distracting anyone else by his inattention.

Disruptive Behavior (DB). A rating of DB indicated that the subject had exhibited some behavior which disrupted the academic performance of another student. For example, motor behaviors were such behaviors as getting out of one's seat, standing up, walking around, rocking in one's chair, moving the chair, gesturing without talking, showing an object without talking, tapping another student to get his attention, throwing objects, or any other disruptive movement without noise. Also, tapping feet, clapping hands, tearing papers, tapping one's pencil on the desk, or any other nonverbal noise-producing behavior which was not directly involved in TR was rated as DB. Aggressive behaviors such as hitting, pushing, shoving, pinching, slapping, poking with objects, grabbing objects from another student, and destroying objects were rated as DB.

Observation and Recording

Observers used a 10-second time-sampling procedure to record the above categories of classroom behavior. The observer kept his eyes on the second hand of a stopwatch until the end of a 10-second time interval; and then he looked up at the subject he was observing and recorded the behavior he observed. The observer then returned his eyes to the watch and kept them there until the end of the next 10-second interval. The observers were cautioned to record only one category of behavior during a 10-second interval. Each subject was observed for a total of six-minutes per class period. However, the observer recorded the behaviors of one subject for one-minute and then observed another subject for one-minute until all six subjects were observed. The observer repeated the cycle of observing each subject for one-minute six times. The sequence for observing the subjects was random for each cycle.

Observer Training and Reliability

The observers were instructed that they must be aware of classroom procedures, in order to know that behavior was appropriate for a given situation. For example, the teacher may have allowed talking after students had finished their assignments. If the observers were not aware of such a situation, they may have recorded the subject's behavior incorrectly. Observers were also instructed not to interact with either pupils or teacher while in the classroom. They were repeatedly reminded to remain as unobtrusive as possible while in the classes. The observers were not informed about the purpose of the study or when changes in the experimental conditions occurred.

Reliability testing sessions simulated the actual classroom observation process which was described above. Videotapes of actual class sessions were used. As the observers watched the videotape, they recorded the classroom behaviors of designated pupils for a minimum of 18 minutes, or 108 10-second intervals. At the end of the reliability testing session, all data sheets were checked for agreement of ratings. If all ratings were not the same at a given interval, then agreement was not evident and the interval was counted incorrect. The incorrect ratings of all observers were then tabulated. If the combined incorrect ratings of the observers did not exceed 15 percent of the total number of behaviors recorded, then an acceptable level of reliability was considered acceptable. If, however, the total number of incorrect responses was more than 15 percent of the total score, then further training and review were given. Following the review session, another reliability test utilizing a new videotape was given. One test for observer reliability was conducted during each of the four experimental conditions of the investigation. After the training sessions, observer reliability was established at .88; the four subsequent sessions yielded reliability scores of .93, .95, .96, and .95.

Grader

In an attempt to insure impartiality in evaluating the subjects, all academic classroom work was scored by a trained grader. The participating teachers did not grade any academic material or test. The grader was an experienced teacher who had a background in mathematics, and who was not employed at the site of the investigation. Essentially, the grader: (1) evaluated the work of the subjects according to the

criteria established by the previously distributed behavioral objectives, and (2) scored tests which were administered during the investigation. For example, pre and posttests administered during Condition Two were scored by the grader. Also, the grader scored the tests given during the four conditions of the study. In this manner, an attempt was made to eliminate teacher bias in assignment of grades. The grader was not told the purpose of the study or when changes in the experimental conditions occurred.

Teacher Training

After the second week of Condition One, both teachers were given instruction in writing behavioral objectives and in developing criterion-referenced measuring tests. They were then requested to prepare behavioral objectives for one unit which would account for approximately three weeks of the study and one covering about two weeks of work. The behavioral objectives were written so that a new set could be distributed to the students each day. The investigator examined each set of behavioral objectives for clarity of purpose, statement of criteria, and conditions before allowing the participating teachers to distribute them to the students. The behavioral objectives, after approval, were utilized during Condition Two and Condition Four. The teachers were instructed also to construct a pretest and a posttest for use during Condition Two. Again, these instruments were examined by the investigator before they were administered. The teachers were instructed to provide all students an opportunity to remediate before beginning a new set of objectives. Neither teacher was told the purpose of the

study, and neither of them was given any information regarding the nature of the data that were recorded by the observers and the grader.

Experimental Design

The study consisted of four conditions (the first baseline, the first treatment, the second baseline, and the second treatment).

Condition One. Observers recorded behavioral data, and the grader scored academic classwork, homework, and mathematics tests. This condition lasted 12 school days. At the end of this condition both teachers were trained to write behavioral objectives, teach lessons derived from the objectives, and to use criterion-referenced measurement.

Condition Two. The first treatment condition also lasted 12 school days. It was begun with the administration of a mathematics pretest covering a new unit of work for the subjects. Behavioral objectives were distributed daily by the teachers to all pupils in the selected classes. Free time was awarded to those pupils who successfully completed the assigned objectives for the given day. These pupils were also given the option to begin working on the next set of behavioral objectives. Those who were not successful in their attempt to meet the objectives were given the opportunity to engage in similar learning activities until they reached the prespecified goals. Then they moved to the next set of behavioral objectives. The mathematics posttest was administered at the end of this condition.

Condition Three. The second baseline condition lasted seven school days. The participating teachers were instructed to return to their pre-experimental way of instruction. They were reminded to

refrain from using behavioral objectives, criterion evaluation, or remediation procedures.

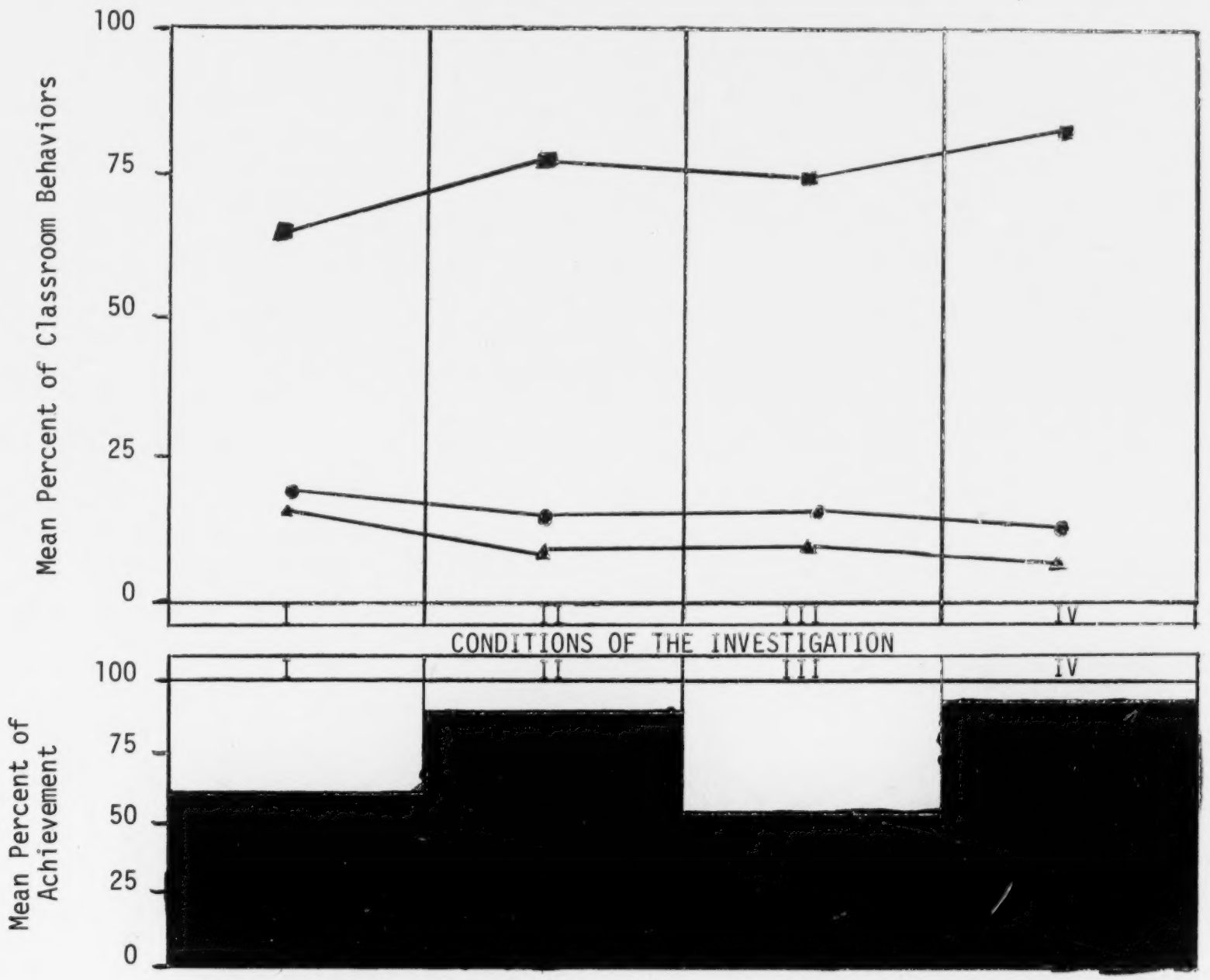
Condition Four. The second treatment condition lasted five school days. Procedures in this condition were designed to replicate those in condition two. An observer reliability testing session was conducted in this condition, as well as in each of the previous three conditions.

RESULTS

Twenty-two eighth grade disruptive students from four classes provided data for classroom behaviors (TR, TO, and DB) and academic achievement (criterion tests) as a function of the four conditions of the study. These data are presented in Figure I. The average percent of TR, TO, and DB behaviors is depicted for each condition. Also, Figure I shows the mean percent of achievement as measured by criterion tests for the two baseline and the two treatment conditions.

The Friedman (nonparametric) two-way analysis of variance test (Siegel, 1956) revealed a significant chi-square for three degrees of freedom (15.02, $p < .01$) for TR behaviors. Post hoc analysis of these data, using the chi-square analog of Scheffé's Theorem (Marascuilo, 1971), indicated significant differences ($p < .01$) between Conditions One and Two and between Conditions One and Four. Examination of Figure I reveals that the mean percentage of TR behaviors was greater under Condition Two than during Condition One. The general level of TR behaviors established in Condition Two was maintained during Condition Three. During Condition Four, the frequency of TR behaviors increased, establishing a pattern similar to that of Condition Two.

FIGURE I
MEAN PERCENT OF CLASSROOM BEHAVIORS AND
ACHIEVEMENT OVER THE FOUR CONDITIONS
OF THE INVESTIGATION



Using the Friedman two-way analysis of variance, TO behaviors were found to be significantly different (chi-square 21.64, df = 3, $p < .01$). Post hoc analysis indicated significant differences for TO behaviors between Conditions One and Two ($p < .01$), between Conditions One and Three ($p < .05$), and between Conditions One and Four ($p < .01$). As with TR behaviors, the general level of TO behaviors established in Condition Two was maintained for Condition Three. And during Condition Four, the frequency of TO behaviors decreased, establishing a pattern similar to that of Condition Two. There were no significant differences between the last three conditions of the study for TO behaviors.

The Friedman test for DB behaviors indicated that for a chi-square of 17.76, with df = 3, a significant difference was found ($p < .01$). Post hoc contrast of these data revealed differences in DB behaviors between Conditions One and Two ($p < .05$) and between Conditions One and Four ($p < .01$). Again, inspection of Figure 1 indicates that the same pattern existed for DB as for TR and TO behaviors. In other words, as TR behaviors of the subjects became more frequent, both TO and DB behaviors decreased in frequency, and vice-versa.

The results of the Friedman test for differences in academic averages indicated that a chi-square of 44.19, df = 3, was significant ($p < .01$). Post hoc contrasts between average percent of achievement on criterion tests revealed significant differences ($p < .01$) for the following: Conditions One and Two, Conditions One and Four, Conditions Two and Three, and Conditions Three and Four. Thus, the average percent of achievement on the criterion tests was significantly higher in both treatment conditions (Two and Four) than during the baseline conditions (One and Three). Also, using the Wilcoxon Matched-Pairs Test (Siegel,

1956), a significant difference ($p < .01$) was found between the pretest and posttest administered during the first treatment condition.

DISCUSSION

From this investigation it was concluded that the use of behavioral objectives and criterion evaluation had a positive effect on the classroom progress of adolescents. It was found that teachers were able to write behavioral objectives and employ criterion evaluation so that learners reaped greater benefits in that instructional setting than in conventional settings. Further, it may be said that the process of remediation expanded the opportunity for learners to reach prespecified goals, particularly since this process enabled them to recycle their learning activities and encouraged success.

Since Time Off Task behaviors did not increase significantly in Condition Three back to the level of those in Condition One, and since the achievement levels did decrease in Condition Three, it was concluded that time spent by the subjects pursuing a learning goal was not nearly as vital to learning as the process by which they were taught. Therefore, teacher preparation to utilize behavioral objectives and criterion evaluation emerged as the major determinant of academic variations. Further evidence was found to support this conclusion when the data revealed that disruptive behaviors were relatively unaffected by experimentation during reversal.

The lack of significant difference in all categories of classroom behavior between Condition Two and Condition Three as well as between Condition Three and Condition Four is no real cause for alarm. Since Condition Three had a duration of only seven school days and Condition

Four was only five school days in length, effects of the use of behavioral objectives and criterion evaluation in Condition Two may well have carried over into the other conditions, particularly since many of the subjects had experienced such drastic improvement in Condition Two.

The significant difference in Time Off Task behaviors which occurred between Condition One and Condition Three (the two baseline conditions) indicated that children are more willing to continue learning efforts if teachers are willing to "pay off" for desired behavior. The behaviors which apparently were reinforced by a sense of accomplishment did not decrease significantly following Condition Two. In other words, when the use of behavioral objectives, criterion evaluation, and remediation was eliminated in Condition Three, the subjects continued to exhibit a higher rate of Task Relevant behaviors while their Disruptive Behavior remained essentially the same. Hence, individualization of the instructional process (as opposed to lockstep classroom procedures) apparently served as a strong reinforcer to the subjects.

It should be emphasized that, essentially, for the first time in recent years these subjects had experienced substantial academic progress in Condition Two. Thus, they apparently were more willing to continue to exhibit more Task Relevant behaviors even though their rate of Disruptive Behavior did not change noticeably. This development also indicated that an increased amount of time spent on learning tasks was not the primary consideration. For, a comparison of classroom behavior patterns and achievement revealed that achievement levels decreased drastically during Condition Three even though the subjects were spending more time on learning tasks than they did in Condition One. Since the "pay off" (a sense of accomplishment resulting from a modification

in instructional technique) in Condition Two apparently caused Task Relevant activity to continue at a more frequent rate in Condition Three than in Condition One, it was assumed that the lack of continued academic gains was not caused by pupil misbehavior (DB) or inattention (TO), but by the change in instructional process.

The present investigation utilized behavioral objectives and criterion evaluation as means to increased levels of achievement. Participating teachers in the studies referred to in the introduction were given a set of behavioral objectives and were instructed to teach for the achievement of those goals. They selected their own processes. In the present investigation, however, the participating teachers were trained to write and to use behavioral objectives and to employ criterion evaluation. Each set of daily objectives was submitted to the investigator for approval with regard to clarity, levels of expected competency, and conditions. The same procedure was used when examinations were given. Criterion evaluation was the source of measurement, and remediation increased the possibility of goal attainment. These controls which were applied to the use of behavioral objectives and criterion evaluation vastly improved teacher understanding of the process and provided for uniform manipulation of the independent variable. Consequently, changes in achievement patterns were decisive.

Of particular interest to many is the fact that, although no direct manipulation was employed to control the classroom behavior of the disruptive students, TR behaviors increased significantly during treatment conditions. And, as the TR behaviors increased in frequency, TO and DB behaviors decreased.

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